

REMARKS

Initially, in the Decision on Petition dated March 24, 2005, the Examiner notes that the Petition to Make Special filed December 29, 2004 is defective for failing to provide a complete detailed discussion of the most closely related references with the necessary specificity. In addition, the Examiner notes that independent claim 10 differs in scope from the discussion presented in the petition with respect to independent claims 1, 9 and 12.

The present invention as recited in the claims is directed to, among other things, a method of backing up storage regions of a disk array in a computer system having a computer and the disk array that provides the storage regions used by the computer as an external storage, that includes: transmitting from the computer to the disk array a backup command accompanied by information about a first storage region having stored therein data to be backed up within the disk array and information about a second storage region into which the data to be backed up is to be stored as backup data within the disk array; backing up the data of the first storage region into the second storage region by the disk array in response to the command; sending from the computer to the disk array at least the information about the second storage region and information about backup of the first storage region; and storing, by the disk array, at least the information about the second storage region and the information about backup of the first storage region sent as above into a storage region different from the second storage region within the disk array so that both the information can be stored as management information for the backup

data, and to be associated with the backup data.

It is submitted that the cited references, whether considered alone or in combination, fail to disclose or suggest the invention as claimed. In particular, the cited references, at a minimum, fail to disclose or suggest storing, by said disk array, at least said information about a second storage region and an information about backup of a first storage region into a storage region different from said second storage region within said disk array so that both said information can be stored as management information for said backup data, and to be associated with said backup data, and/or backing up said data of said first storage region into said second storage region in response to a command, and/or means for making said first storage region and said second storage region be associated with each other on the basis of a command from a computer, and/or means for storing information about said first storage region and information received from said computer in said second storage means, and/or means for storing at least said information about said second storage region and said information about the backup of said first storage region on the basis of at least said information about said second storage region and said information about said backup of said first storage region so that said management information can be stored in association with said backup data.

All of the independent claims recite at least one of these features or this feature, if there is only one. In particular, independent claim 1 recites storing, by said disk array, at least said information about said second storage region and said information about backup of said first storage region sent as above into a storage

region different from said second storage region within said disk array so that both said information can be stored as management information for said backup data, and to be associated with said backup data. Independent claim 9 recites backing up said data of said first storage region into said second storage region in response to said command, and storing at least said information about said second storage region and said information about said backup of said first storage region as management information for said backup data in a storage region different from said second storage region within said disk array so that said management information can be recorded in association with said backup data. Independent claim 10 recites means for making said first storage region and said second storage region be associated with each other on the basis of a command from said computer; and means for storing information about said first storage region and information received from said computer in said second storage means. Independent claim 12 recites means for storing at least said information about said second storage region and said information about the backup of said first storage region sent as management information for said backup data from said computer in a storage region different from said second storage region within said disk array on the basis of at least said information about said second storage region and said information about said backup of said first storage region so that said management information can be stored in association with said backup data.

The references considered most closely related to the claimed invention are briefly discussed below:

U.S. Patent No. 6,205,450 (Kanome) discloses a disk snapshot section inserted between a file system and a disk unit appropriately takes a snapshot that holds the contents of files stored in the disk unit at a predetermined timing, and stores the snapshot in the disk unit. The disk snapshot section sets a virtual disk drive which stores files having the contents held by the designated snapshot upon restarting the system, and makes the file system recognize the virtual disk drive. The system can be easily restarted using a disk image of an arbitrary snapshot. Kanome, at a minimum, fails to disclose or suggest storing, by a disk array, at least said information about a second storage region and an information about backup of a first storage region into a storage region different from said second storage region within said disk array so that both said information can be stored as management information for said backup data, and to be associated with said backup data.

U.S. Patent No. 6,691,245 (DeKoning) discloses a mirrored data storage system utilizes a first host device and a local storage device for primary data storage and a second host device and a remote storage device for mirrored, fail-over storage on behalf of client devices. At periodic intervals (called checkpoints), the first host device initiates data synchronization between itself and the two storage devices and issues checkpoint information to ensure that each device maintains information for a common stable storage state. The local storage device synchronizes its stored data and forwards the checkpoint information to the remote storage device. The remote

storage device maintains a copy (called a snapshot) of the data at the common stable storage state. Given the snapshot and the checkpoint information, the remote storage device can restore itself to the common stable storage state in the event of a failure of the first host device and/or the local storage device. Upon failure of the first host device and/or the local storage device, the second host device is instructed to initiate a switch, or fail-over, to serving as the primary data storage on behalf of the client devices. DeKoning, at a minimum, fails to disclose or suggest storing, by a disk array, at least said information about a second storage region and an information about backup of a first storage region into a storage region different from said second storage region within said disk array so that both said information can be stored as management information for said backup data, and to be associated with said backup data.

U.S. Patent No. 6,694,413 (Mimatsu et al.) discloses a method of managing snapshot data of a computer system provided with a computer and a storage subsystem coupled to the computer, and the computer system to which the method is applied, are disclosed. The storage subsystem is provided with the duplicated first and second storage units. In the state in which they are duplicated, when a request to update data is issued to the first storage unit, the storage subsystem writes the same updated data onto the second storage unit. When an acquisition of the snapshot is requested by the computer at any time, the storage subsystem suspends the writing of the writing data for the first storage unit onto the second storage unit thereafter. When making the contents of the first storage unit and the second

storage unit the same, the data written onto the first storage unit after the acquisition of the snapshot is requested is written onto the second storage unit. Mimatsu et al., at a minimum, fails to disclose or suggest storing, by a disk array, at least said information about a second storage region and an information about backup of a first storage region into a storage region different from said second storage region within said disk array so that both said information can be stored as management information for said backup data, and to be associated with said backup data.

U.S. Patent Publication No. 2003/0131278 A1 (Fujibayashi) discloses a method for remote backup includes: mirroring data from a primary storage device at a first location to a secondary storage device at a second location; taking a snapshot of the primary storage device and of the secondary storage device; storing the primary storage device and of the secondary storage device; storing the primary storage device snapshot on a first snapshot volume at the first location; storing the secondary storage device snapshot on a second snapshot volume at the second location; updating a data structure to record backup times for the first and second snapshots and to record locations of the snapshots on the snapshot volumes; and repeating the above so as to store multiple generations of snapshots. A method for fast restore uses a selected snapshot located at the first location to restore data. If the selected snapshot at the first location is not available, the selected snapshot at the second location is used. Fujibayashi, at a minimum, fails to disclose or suggest storing, by a disk array, at least said information about a second storage region and an information about backup of a first storage region into a storage region different

from said second storage region within said disk array so that both said information can be stored as management information for said backup data, and to be associated with said backup data.

U.S. Patent Publication No. 2004/0093474 (Lin et al.) discloses a method for efficiently maintaining snapshot instances. To maintain the state of snapshot instances, the snapshot copies the data needed to be protected into free space on the same volume. In order to identify whether a block is free, a snapshot record is created for each block on a volume to record write operations on the block. With these snapshot records, the allocation status of blocks on a volume can quickly be identified. Free space allocation is then accomplished by allocating free space via the file-system provided interface and identifying it with snapshot records. With this mechanism, snapshot software can allocate free space to store snapshot metadata and “copy-to-write” data dynamically. Lin et al., at a minimum, fails to disclose or suggest storing, by a disk array, at least said information about a second storage region and an information about backup of a first storage region into a storage region different from said second storage region within said disk array so that both said information can be stored as management information for said backup data, and to be associated with said backup data.

U.S. Patent Publication No. 2004/0168034 A1 (Homma et al.) discloses a storage apparatus controls primary and secondary volumes as a pair, using a logical snapshot management table that indicates in which volume data to be accessed is retained to thereby enable an immediate access to a logical frozen image. Homma

et al., at a minimum, fails to disclose or suggest storing, by a disk array, at least said information about a second storage region and an information about backup of a first storage region into a storage region different from said second storage region within said disk array so that both said information can be stored as management information for said backup data, and to be associated with said backup data.

U.S. Patent Publication No. 2004/0186900 (Nakano et al.) discloses snapshots are implemented by combining original data in a place where an operational volume has been updated with data in a place where the operational volume has not been updated. A snapshot management table maintains a value indicating that update has not been conducted, or a storage place of original data, for each combination of blocks in the operational volume and the snapshots. If there is a snapshot in which update has not been conducted in a update place at the time of update, then original data is copied and the snapshot management table is updated. The copied original data is managed by a difference block management table, which has a value indicating whether respective snapshots are referencing the data. If a snapshot is deleted, then the value indicating that the snapshot is referencing is altered in all entries in the difference block management table. Nakano et al., at a minimum, fails to disclose or suggest storing, by a disk array, at least said information about a second storage region and an information about backup of a first storage region into a storage region different from said second storage region within said disk array so that both said information can be stored as management information for said backup data, and to be associated with said backup data, and/or

means for storing at least said information about said second storage region and said information about the backup of said first storage region on the basis of at least said information about said second storage region and said information about said backup of said first storage region so that said management information can be stored in association with said backup data.

Therefore, since the references fail to disclose storing, by said disk array, at least said information about a second storage region and an information about backup of a first storage region into a storage region different from said second storage region within said disk array so that both said information can be stored as management information for said backup data, and to be associated with said backup data, and/or backing up said data of said first storage region into said second storage region in response to a command, and/or means for making said first storage region and said second storage region be associated with each other on the basis of a command from a computer, and/or means for storing information about said first storage region and information received from said computer in said second storage means, and/or means for storing at least said information about said second storage region and said information about the backup of said first storage region on the basis of at least said information about said second storage region and said information about said backup of said first storage region so that said management information can be stored in association with said backup data, it is submitted that all of the claims are patentable over the cited references.

U.S. Application No. 10/650,858

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of Mattingly, Stanger, Malur & Brundidge, P.C., Deposit Account No. 50-1417 (referencing attorney docket no. 500.43092X00).

Respectfully submitted,

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